

**HISTORY 11**  
**Science, Religion, and Myth**  
Spring 2001

Instructor: Stephen McCluskey

TTH 2:30-3:45

Office Hours: TTh 3:45-5:00

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Required Texts (in paperback):

David C. Lindberg. *The Beginnings of Western Science*

Richard S. Westfall. *The Construction of Modern Science*

Mary Lynn Rampolla. *A Pocket Guide to Writing in History* (3rd. ed.)

I enjoy this course more than any other I teach; I hope you find it as much fun as I do. Its central theme is the historical development of ideas about nature, from their prehistoric origins to the establishment of Newtonian science. In tracing this theme we will occasionally come into contact with other approaches to nature: religion, myth, magic, and technology. Nonetheless, the central theme of the development of scientific ideas and institutions will take up the major portion of the course. The formal definition in the University catalog reads:

History 11 -- **Science, Religion, and Myth** Surveys human understandings of nature from prehistoric astronomies and Babylonian myths through ancient and medieval thought to the new sciences of Copernicus, Galileo, and Newton.

I expect you to get three things out of this course. The first is an understanding of the historical process by which human understandings of nature developed and how, as scientific understandings of nature developed, those understandings related to other kinds of understandings expressed in religious or mythological terms. Second is an understanding of how historians come to understand events that took place in the past, including the historical development of scientific ideas and institutions. But the last thing you learn may, in the long run, be even more useful. In the course of the semester you will write a lot: essay questions in exams and a major term paper. These projects will give you practice in organizing evidence to demonstrate a point, something you'll find yourself doing in formal and informal settings for the rest of your life.

Despite the course's focus on science this is a history course, not a science course. That means that those of you who don't feel comfortable with science won't be loaded with a lot of the scientific detail that you don't really understand. On the other hand (notice how professors always seem to have (at least) two hands), it means that you're going to have to learn some of the specific historical details and understand how those details form a coherent picture of how sciences "fit" into specific times and places. If you find me talking about something that you don't quite understand, feel free to ask a question. I really don't mind. In fact, some of the most interesting classes happen when people ask what seems, at first, like a dumb question.

At WVU students and professors don't see much of each other—especially in classes this big. It's one of the problems of a large university but it doesn't need to be that way. Feel free to wander up to the second floor of Woodburn during office hours to drop in. If you're handy with E-Mail, drop me a line and I should get back to you shortly. I like this class, I enjoy talking about it, and would be glad to answer your questions, point you in promising directions on your term paper, or just chat

about anything that seems interesting. If my office hours don't fit your schedule, drop in or give a ring and we can work out a mutually convenient time.

### **Requirements and Grading Policy**

My grading philosophy is that the grades of A and F are exceptional grades. It is hard to get an A in this course; it is also hard to fail. The two easiest ways to fail are by not completing all the required assignments or by engaging in plagiarism.

**Exams:** The Mid-term Exam will be on Thursday, Feb. 22. It will consist of one essay question and a number of short identification questions. The Final Exam will be held as scheduled in the University Schedule of Examinations from 8:00 - 10:00 AM on Monday, Apr. 30 in the regular classroom. It will be similar to the mid-term, consisting of two essay questions, one covering the last half of the course and one comprehensive question, and a number of short identification questions. A study guide, including the essay questions to appear on the exam, will be passed out about a week before each exam.

**Attendance:** I take attendance almost every day of class. Points are deducted for every day missed. Missed days for which you give me a reason will be counted as a half-day missed (even in the business world there's usually some cost for sick days taken).

**Quizzes:** From time to time I will give short quizzes based on the assigned readings; some will be objective questions, some short essays. They will be graded on a simple satisfactory / unsatisfactory basis. There will be no make-ups for missed quizzes, although I will drop one unsatisfactory or missing grade.

**Term Paper:** In addition, a 1500-2000 word paper (7-10 typewritten pages) will be required, presenting a *historical* discussion of one aspect of the history of science, (preferably focusing on its relations with religion or myth) at a specific time and place prior to the year 1720. (A discussion of these topics in a more recent "primitive" culture will also be acceptable.) The paper must deal with this topic in a critical manner and be based upon evidence you have gathered from a range of secondary sources (books, journal articles, etc.).

On Thursday, Feb. 1 you will turn in a typed half-page prospectus discussing the central question you plan to raise and the kinds of evidence you will use to answer them, along with a typed twenty item working bibliography of books and articles in scholarly journals that you believe might provide such evidence. This will be returned with recommended changes, additions, etc. on Thursday, Feb. 8.

A typed first draft of the paper, *accompanied by the graded prospectus and bibliography*, will be due Thursday, Mar. 15 and will be returned during office meetings scheduled on Wednesday through Friday, Mar. 21 through Mar. 23. The first draft will follow the style given in Rampolla's *Pocket Guide* and include full footnotes (or endnotes) and a bibliography of the references *actually* used in preparing the paper. *Bring the principal reference works* you have used to this meeting so we can discuss your use of the sources and their limitations.

The final draft of this paper, revised on the basis of criticisms of the first draft, will be submitted *along with the graded prospectus and first draft*, on Tuesday, Apr. 26. The final draft should not merely answer the questions noted on the first draft, but should represent *a substantial revision and improvement* of the first draft. It will therefore be graded more rigorously.

Make-up examinations and late papers will be graded more severely than those submitted on the assigned date and will generally have a lower grade than if they were submitted on time.

**Plagiarism:** All cases of plagiarism will be reported to the dean in accordance with the formal procedures outlined in the Undergraduate Catalog. Depending on the severity of the offense, plagiarism will lead to anything from a failing grade in the assignment to a failing grade for the course. Flagrant offenders can suffer additional university penalties. If you don't know what plagiarism is, find out. There is a clear discussion in section 5b of Rampola's *Pocket Guide to Writing in History*.

The final grade for the course will be determined on the following basis:

Attendance	50 points
Quizzes	50 points
Mid Term Exam	100 points
Prospectus / Bibliography	25 points
First Draft of Paper	50 points
Final Draft of Paper	125 points
Final Exam	150 points
<b>COURSE TOTAL</b>	<b>550 points</b>

Grade records are kept on a numerical, rather than a letter grade basis. Keep that in mind if you are trying to compute your expected grade.

### Schedule of Classes

You will be expected to have read the assigned readings *before* the class of the day for which they are assigned. From time to time I will give short quizzes on the assigned readings.

Tue. Jan. 9 Term papers, bibliographic tools, and an introduction to the Library

Thu. Jan. 11 Science and Religion; Technology and Magic

Discussion attempting to establish working definitions of **Science, Religion, Technology and Magic** in order to differentiate among these four human activities.

Lindberg, pp. 1-4

Tue. Jan. 16 Natural Knowledge in the American Southwest

FILM: The Sun Dagger

Taking the Puebloan peoples as an example, we will begin to consider the practice of science in traditional, non-literate cultures. What are the religious reasons for such practices; what are the scientific reasons? What do these suggest about the mutual relationships of science and religion?

Lindberg 4-13

Thu. Jan. 18 Babylonian Myth, Ritual, and Astronomy

Among their other functions, myths embody answers to scientific questions. Are such myths properly considered science? Why or why not?

Handout: Babylonian Lunar Texts

Lindberg, pp. 13-20

Tue. Jan. 23 Writing a History Paper

Discussion of the problems we all encounter in formulating a good historical question, in finding and evaluating the evidence to answer that question, and in presenting our answer to that question.

Rampolla, pp. 1-5, 13-20, 23-26, 32-51, 57-67.

Thu. Jan. 25 The Ionian Greeks and the rejection of myth

The early Greeks developed models of explanation that differed significantly from earlier explanations. Consider both the causes and effects of these differences.

Lindberg, pp. 20-35

Tue. Jan. 30 Plato and the Religion of Rationality

Discussion of Plato's criticism of the astronomy of his predecessors. Considering the achievements that have been recounted for the techniques of traditional astronomy, what are we to make of Plato's criticism of predictive astronomy? What is the goal of science if it is not merely prediction? How is this goal attained? Is it even attainable?

Handout: Plato on Mathematical Astronomy (*Republic*, 527<sup>d-e</sup>; 528<sup>e</sup>-530<sup>e</sup>)

Lindberg, pp. 35-45

Thu. Feb. 1 Aristotle and the Contemplative God

#### **Term Paper Prospectus and Bibliographic Exercise Due**

Like most good students, Aristotle ended up by disagreeing with much of what he was taught. Consider the differences between the concept of the world held by Plato and that of his student, Aristotle.

Handout: Aristotle, *On the Parts of the Animals*, 644<sup>b</sup>22-645<sup>a</sup>26

Lindberg, pp. 47-68

Tue. Feb. 6 Healers and Healing in Antiquity

Medicine was the earliest profession to claim to base its activities on scientific grounds. "Scientific" physicians emphasized how they differed from religious healers and unscientific quacks. This claim did much to transform how they studied the causes of disease and practiced medicine.

Lindberg, pp. 69-83, 111-131

Thu. Feb. 8 Ptolemy and the Mathematical Tradition

**Term Paper Prospectus and Bibliographic Exercise Returned**

Mathematics and Science were first closely linked in the sciences of Optics and Astronomy. What role(s) does mathematics play in linking our observations and our understanding of them? Is science necessarily mathematical?

Lindberg, pp. 85-110

Tue. Feb. 13 The monastic learning of the "Dark Ages"

Discussion of the factors leading to the decline of the scientific enterprise. Early medieval thinkers were less concerned with the development of new insights into nature than with the preservation of practical knowledge. Compare this with the practices of traditional cultures. In such a situation, what would be the likely attitude towards scientific innovation?

Handout: Time and Timekeeping in Late Antiquity.

Lindberg, pp. 133-159, 183-190, 348-353

Thu. Feb. 15 Islamic Monotheism and the Unity of Wisdom

"There is no God but God..." reflects the Islamic world's rejection of pagan polytheism. Consider the impact of this uncompromising monotheism on the Islamic world's attitude towards nature and towards ways of understanding nature.

Lindberg, pp. 161-182

Tue. Feb. 20 The Recovery of Ancient Learning

The revival of learning brought together the learning of antiquity, that of the "dark ages" and that of the Islamic world. Pay particular attention to changing attitudes towards education and learning.

Lindberg, pp. 197-206, 261-267

Thu. Feb. 22 **Mid-term Exam** (Through unit on Islam)

Tue. Feb. 27 The Rise of the Universities.

Lindberg, pp. 206-234

Thu. Mar. 1 The Religious critique of Aristotelian rationalism

Discussion of the conflict between Aristotle's concept of science as based on necessary laws and the Christian concept of a powerful and loving God, as it influences the reception of Aristotelian science.

Lindberg, pp. 234-244

Tue. Mar. 6 The Medieval Science of Motion

using mathematics to describe the motion of bodies was not invented in the Renaissance, but began with scholastic discussions in the Medieval universities.

Lindberg, pp. 281-307

Thu. Mar. 8 The Medieval Cosmos

The one mathematical science almost all students studied in the middle ages was astronomy, which provided a link between Aristotle's physics and the concepts of mathematical astronomy.

Lindberg, pp. 245-261, 268-280

Tue. Mar. 13 Copernicus and the Transformation of Astronomy

Handout: The Sun in Renaissance neo-Platonism

Lindberg, pp. 355-368

Thu. Mar. 15 Tycho, observation, and Copernican Astronomy

**Typed First Draft of Paper Due (Along with Graded Prospectus)**

Tycho Brahe performed many highly precise astronomical observations, yet he remained an opponent of the Copernican system. What does this suggest about the role of observation in science?

Westfall, pp. 1-12

Tue. Mar. 20 Celestial Harmonies and the New Astronomy

Johann Kepler was something of an mathematical mystic and ranked observation below mathematical harmonies as the key to understanding the universe, yet he supported Copernicanism while the observer Brahe rejected it. How do we explain this paradox?

Mar. 21 - Mar. 23 Office Meetings to Discuss First Draft of Papers

**Remember to Bring Your Sources to the Meeting**

Thu. Mar. 22 No Class

Mar. 24 - Apr. 1 **Spring Break**

Tue Apr. 3 Bruno and the Reception of Copernican Cosmology

Giordano Bruno reflects a magical element of Renaissance thought. Copernicus's new cosmos offered him the opportunity to create a new vision of the universe in which nature would be viewed as alive to an even greater extent than the medieval world view.

Thu. Apr. 5 Galileo and the Reception of Copernican Astronomy

Consider Galileo's astronomical discoveries and the reactions of the religious establishment. Keep alert for the motives behind the religious reaction to Galileo.

Westfall, pp. 13-24

Tue. Apr. 10 Galileo and the New Mechanics

Galileo is often said to be an experimenter who rejected all ancient authority. Consider the role of experiment and ancient learning in Galileo's mechanical investigations.

Thu. Apr. 12 Descartes and the Mechanical Philosophy

Westfall, pp. 30-39, 43-56

Tue. Apr. 17 Gassendi's Retreat from Certainty

Westfall, pp. 39-42

Thu Apr. 19 Newton and the new view of science

Discussion of Newton, his educational background, and the influences on his scientific development.

Westfall, pp. 65-81, 105-138

Tue. Apr. 24 Newton's Experiments in Optics

**Final Version of Paper Due (Along with Graded Prospectus and First Draft)**

Westfall, pp. 56-64

Thu. Apr. 26 Newton and the *Principia*

Westfall, pp. 139-159

Mon. Apr. 30 **Final Exam (8:00 - 10:00 AM)**